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PENSOFT

First record of *Corallus blombergi* (Rendahl & Vestergren, 1941) (Serpentes, Boidae) from Colombia

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Abstract
We report the first record in Colombia of Blomberg's Tree Boa, *Corallus blombergi* (Rendahl & Vestergren, 1941), based on 2 specimens from Tumaco municipality, department of Nariño, Colombia. The present record extends this species' documented distribution northwest by 55 km from its nearest previously known Ecuadorian occurrence and increases the number of *Corallus* species in Colombia to 5. In addition to summarizing its distribution, we present a brief comparison with the distribution of *C. annulatus* (Cope, 1876), the species most similar to *C. blombergi*.

Key words
Blomberg's Tree Boa; Pacific rainforest; department of Nariño; South America; distribution; range extension.

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Introduction

The Neotropical tree boa genus *Corallus* Daudin, 1803, currently comprising 9 species, is distributed from Guatemala to southeastern Brazil (Henderson 1997, Henderson and Pauers 2012). These snakes inhabit forested habitats, dry scrub, primary rainforest, secondary forests, agricultural areas, and other human disturbed areas (MECN 2010, Henderson and Pauers 2012).

Four species of *Corallus* have been reported in Colombia—*Corallus annulatus* (Cope, 1876), *C. batesii* (Gray, 1860), *C. hortulanus* (Linnaeus, 1758), and *C. ruschenbergerii* (Cope, 1876)—in lowland forests and scrubland, at elevations from sea level to elevations of about 1000 m (Henderson et al. 2009). However, Henderson et al. (2001) suggested that *C. blombergi* (Rendahl & Vesterfren, 1941) is likely in southwestern Colombia, based on an unexamined specimen from Tumaco, department of Nariño, which was deposited at the Instituto de Ciencias Naturales, Universidad Nacional de Colombia (ICN-R 6680). Although they thought that this specimen was most likely *C. blombergi*, they had not examined it and were reluctant to assign it to this species.

Corallus blombergi was considered to be endemic to Ecuador. This is an uncommon boid snake described by Rendahl and Vestergren (1941) as a subspecies of *C. annulatus*. The subspecies was described based on a single specimen from Río Zamora, eastern Ecuador. Rendahl and Vestergren (1941) diagnosed the 3 subspecies, *C. a. annulatus, C. a. blombergi*, and *C. a. colombianus*, by the lepidosis of snout, the presence or absence of a nasal-infraloreal contact, and the number of supraloreals present. However, Peters (1957) suggested that these

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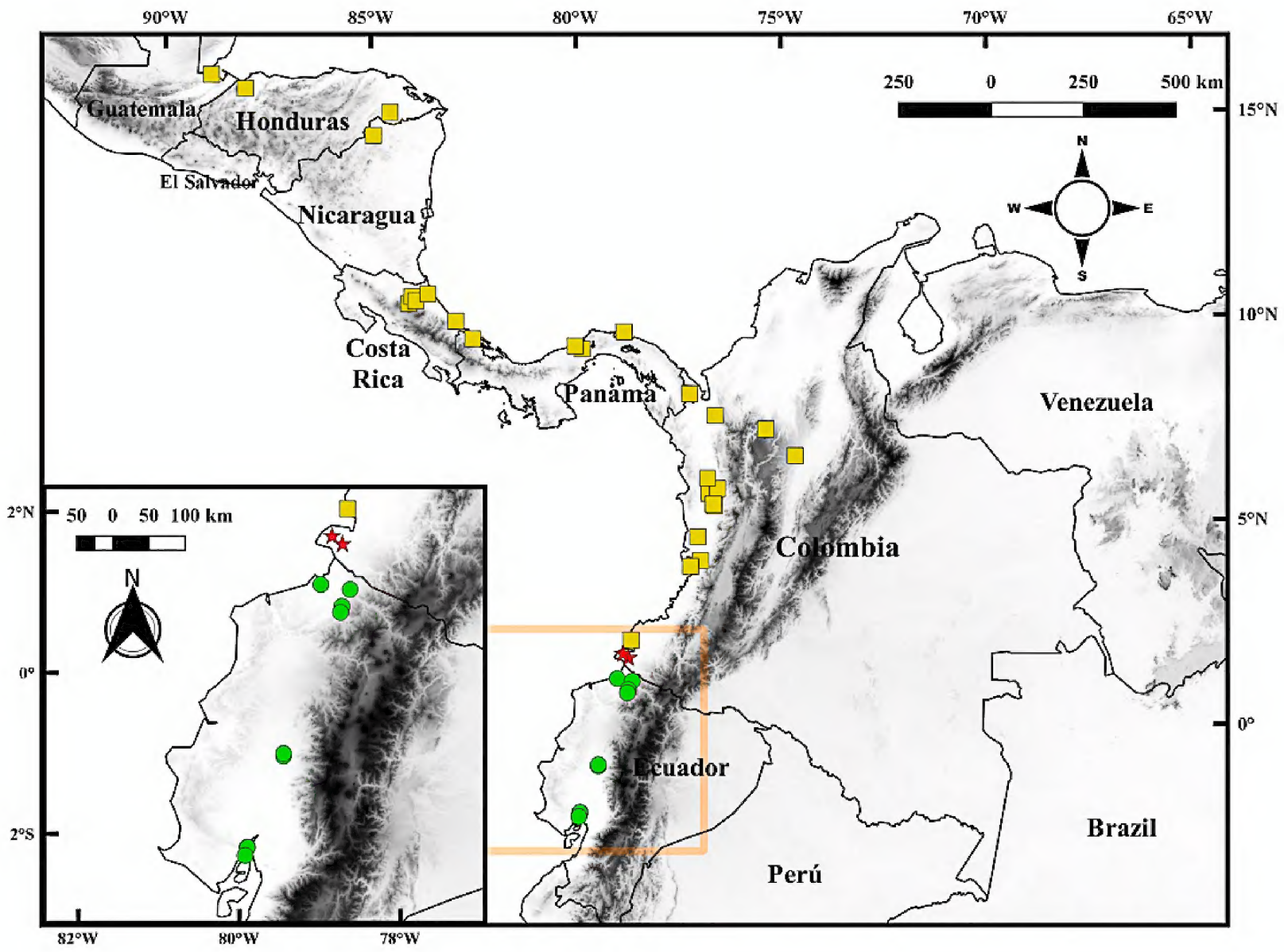

Figure 1. Distribution map of *Corallus blombergi* and *C. annulatus*. The yellow squares correspond to the records of *C. annulatus* (Appendix 1). The green dots indicate previous records for *C. blombergi* in Ecuador (Appendix 1). The red stars indicate the new localities where the specimens of *C. blombergi* were found at Tumaco municipality, department of Nariño, Colombia.

characters were of doubtful validity. Later, Orcés and Matheus (1988) and Henderson et al. (2001) concluded that none of these characters have a diagnostic value because of their ambiguity and variability. Henderson et al. (2001) elevated *C. blombergi* to full species, based on morphological characters and geographic distribution.

Here, we confirm the presence of *C. blombergi* in southwestern Colombia, summarize its distribution, and provide morphological differences to the most closely related species, *C. annulatus*.

Methods

A field survey was carried out in Nariño, Colombia by means of active searching method. The specimens collected were euthanized, fixed in 10% formalin and preserved in 70% ethanol. They were deposited at the reptile collection of the Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Bogotá, Colombia (ICN-R). The collecting activities were legally permitted under Permiso Marco de Recolección de Especímenes Number 0255, Universidad Nacional de Colombia-Ministerio del Medio Ambiente y Desarrollo Sostenible.

Institutional acronyms for museum collections follow those of Sabaj-Perez (2016), except for that of the scientific collection of reference Zoological-Herpetology, Universidad Tecnológica del Chocó "Diego Luis Córdoba" (UTCH: COLZOOCH-H).

Results

New record of *C. blombergi*. Colombia: Nariño, Tumaco, Vereda Cajapí km 30 (01°36.60′ N, 078°43.23′ W; 20 m above sea level), 11 September 2015, Martha Calderón collector, 1 individual (ICN-R 12654);

Other records examined of *C. blombergi*. Colombia, Nariño, Tumaco (01°42.03′ N, 078°50.74′ W; 11 m above sea level), 1 individual (ICN-R 6680) (Fig. 1). This was the specimen reported by Henderson et al. (2001) as probably representing *C. blombergi*.

Record of *C. annulatus*. Colombia, Nariño, Salahonda, Francisco Pizarro (02°02.46′ N, 078°39.22′ W, 11 m above sea level), 1 March 2016, Guido F. Medina collector, 1 individual (ICN-R 12701). This is a similar species, collected in a nearby locality, in a straight-line distance of 55 km from the collecting site of the new record of *C. blombergi*.

Identification. Henderson et al. (2001) diagnosed *C. blombergi* by the combination of the following characters: nasal contact usually absent, 76–86 subcaudal scales, 50–55 dorsal scale rows, and 251–269 ventral scales; dorsal ground color milk-chocolate brown, dorsal blotches usually 7–8 scales wide at midbody, central area of dorsal blotches paler than dorsal ground color (Fig. 2), and 6 infraloreals plus loreals (Fig. 3).

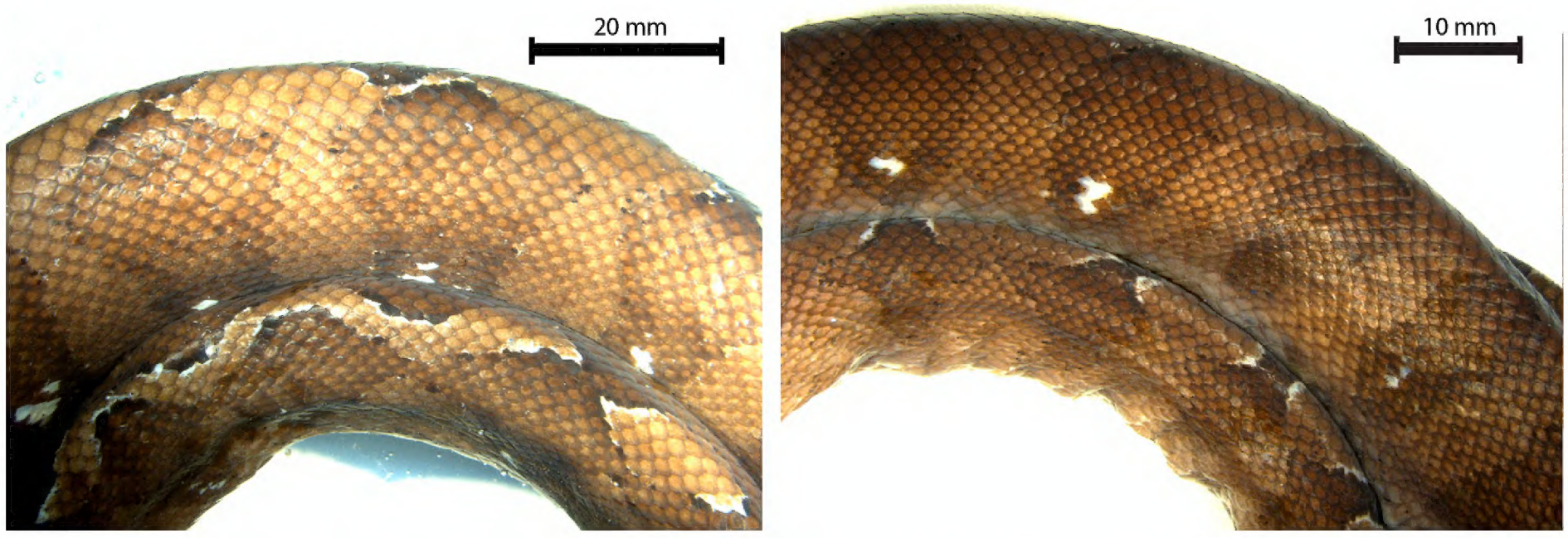

Figure 2. Dorsal body blotch size differences between *C. annulatus*, ICN-R 12701 with blotches 11 scales wide (left), and *C. blombergi*, ICN-R 12654 with blotches 8 scales wide (right).

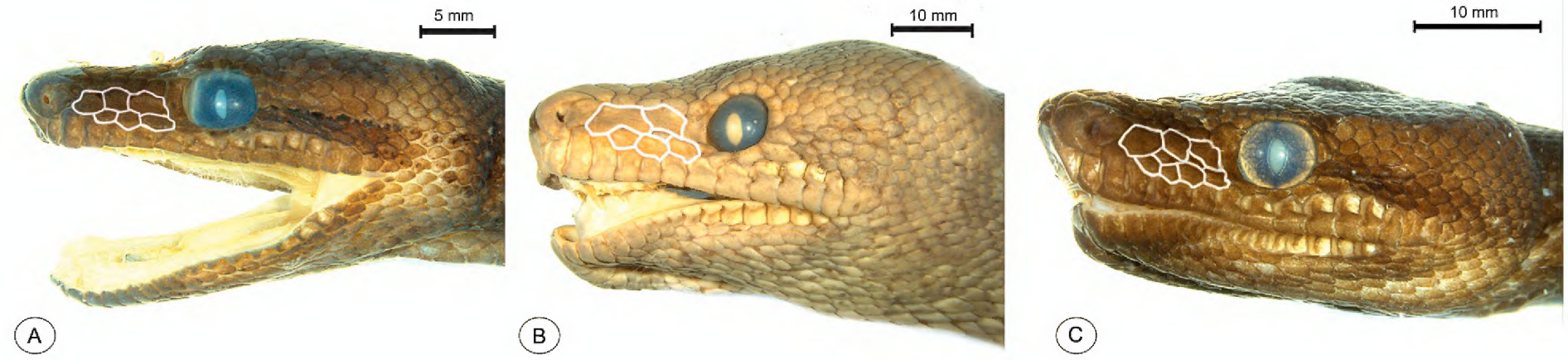

Figure 3. Lateral head views illustrating the number of infraloreals+loreals (highlighted). **A.** *C. blombergi*, ICN-R 12654, 6 infraloreals + loreals. **B.** *C. blombergi*, ICN-R 6680, 6 infraloreals + loreals. **C.** *C. annulatus*, ICN-R 12701, 9 infraloreals + loreals.

The specimen referenced by Henderson et al. 2001 (ICN-R 6680) and our specimen (ICN-R 12654) agree with the diagnosis of *C. blombergi* by Henderson et al. (2001) in the absence of nasal contact, presence of 6 infraloreals plus loreals, dorsal blotches 8 scales wide at midbody, 254–256 ventrals, and milk-chocolate brown dorsal ground color (Table 1, Figs 2, 3).Taking into account the diagnosis and comparisons provided by Henderson et al. (2001), we found that in the specimens examined of *C. blombergi*, the number of subcaudal and dorsal scale rows are differing by 1–4 scales (Table 1). This slight variation could be explained by the small sample size reported by Henderson et al. (2001), meaning that the actual scale ranges are probably underestimated. The identity of both specimens was confirmed by Henderson (pers. comm. 2017).

Henderson et al. (2001) distinguished *C. annulatus* from *C. blombergi* mainly because the former has a red-brown dorsal ground color, the dorsal blotches 9–10 scales wide at midbody, the central areas of dorsal blotches essentially the same shade as the dorsal ground color, and 8–9 loreals plus infraloreals. Specimen ICN 12701 has 9 loreals plus infraloreals, dorsal blotches 11 scales wide at midbody and the color pattern of the dorsal blotches as expected. Thus, we identified our specimen as *C. annulatus* (Table 1, Figs 2, 3). This identity was also confirmed by Henderson (pers. comm. 2017)

Discussion

Corallus blombergi was previously believed endemic to western Ecuador, although it was suspected to occur in Colombia. Herein, we provide the first definite record of this species in Colombia, extending its geographic range by about 55 km northwest (Henderson 1993). This is a very rare snake that inhabits the understory and canopy of tropical rainforest and tropical moist coastal forest, but it is apparently tolerant to disturbance since it also inhabits disturbed or modified habitats (Henderson et al. 2001, Valencia et al. 2008, MECN 2010).

This species is being severely affected by habitat loss, its populations are severely fragmented, and its area of

Table 1. Scale counts obtained in this study from specimens examined of *C. blombergi* (ICN-R 6680, ICN-R 12654) and *C. annulatus* (ICN-R 12701) from southwestern Colombia.

Catalog no.	Sex	Ventrals	Subcaudals	Dorsals	Loreals + infraloreals	Blotch size	Scales between supraorbitals
ICN-R 6680	Male	256	77	38–51–26	6	8	8
ICN-R 12654	Female	254	90	39–49–25	6	8	8
ICN-R 12701	Male	261	82	43–54–29	9	11	10

occupancy is small; for these reasons *C. blombergi* has been categorized as Endangered by the IUCN (Cisneros-Heredia 2016). The previously known Extent of Occurrence (EOO) of this species was less than 4000 km^2 (Cisneros-Heredia 2016), but with the Colombian records added, its EOO increases to 5400 km^2, according to an approximation made with GeoCAT (Bachman et al. 2011). This change in EOO (>5000 km^2) and the possibility of increasing the number of locations (>5) imply consider a change to Vulnerable using the criteria B1ab(iii,iv,v).

Hence, the importance of new records in Colombia, which open the possibility that this species has a slightly greater distribution range that possibly includes protected areas in Colombia. However, it seems likely that records in Tumaco are at the northernmost limit of the species, because *C. annulatus* was recorded only a few kilometers to the north (Fig. 1), showing a parapatric distribution or an area of contact between these sister species. This is an important topic for biogeographical studies of the genus.

We attribute the presence of *C. blombergi* in Colombia partly to the continuity of ecosystems on the Southwest Pacific Plains acting as a corridor for rainforests; however, the presence of this species is mainly due to the biogeography of the rainforests of the Ecuadorian western region (Colston et al. 2013). With increased human population and intrusion into the Chocó Biogeographic Region, threats to this species, such as agriculture, livestock farming, logging, urban growth, and illegal mining, are increasing.

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Authors' Contributions

MAP collected the data, MAP and GFM identified the specimens, GFM made the distribution map, MAP and GFM wrote the text.

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Appendix

Table A1. Locality records of *Corallus annulatus* and *C. blombergi*. SIB: Sistema de Información sobre la Biodiversidad de Colombia. VertNet: classic vertebrate networks.

Species	Latitude	Longitude	Country	Province / department	Locality	Specimen collection	Source
C. annulatus	07°31.51′ N	076°35.81′W	Colombia	Antioquia	Chigorodo, Farm La Mejia	MHUA-R 14910	SIB
C. annulatus	06°32.81′N	074°38.62′W	Colombia	Antioquia	Maceo	MHUA-R 14422	SIB
C. annulatus	07°11.56′N	075°21.80′W	Colombia	Antioquia	Yarumal	MHUA-R 14015	SIB
C. annulatus	05°59.81′N	076°47.04′W	Colombia	Chocó	Medio Atrato, Beté	UTCH: COLZOOCH-H: 0596	SIB
C. annulatus	05°40.90′N	076°35.87′W	Colombia	Chocó	Quibdó, Pacurita	UTCH: COLZOOCH-H: 1538	SIB
C. annulatus	05°40.90′N	076°35.87′W	Colombia	Chocó	Quibdó, Pacurita	UTCH: COLZOOCH-H: 1539	SIB
C. annulatus	05°44.58′N	076°32.30′W	Colombia	Chocó	Quibdó, Tutunendó	UTCH: COLZOOCH-H: 0985	SIB
C. annulatus	05°37.58′N	076°44.93′W	Colombia	Chocó	Río Quito, San Isidro	UTCH: COLZOOCH-H: 0071	SIB
C. annulatus	05°37.58′N	076°44.93′W	Colombia	Chocó	Río Quito, San Isidro	UTCH: COLZOOCH-H: 0633	SIB
C. annulatus	04°33.88′N	077°01.52′W	Colombia	Chocó	San Juan River	NRM 3117 USNM 73298	Henderson et al. (2001)
C. annulatus	05°21.62′N	076°38.75′W	Colombia	Chocó	Unión Panamericana, Salero	UTCH: COLZOOCH-H: 1213	SIB
C. annulatus	05°21.62′N	076°38.75′W	Colombia	Chocó	Unión Panamericana, Salero	UTCH: COLZOOCH-H: 1236	SIB
C. annulatus	05°21.62′N	076°38.75′W	Colombia	Chocó	Unión Panamericana, Salero	UTCH: COLZOOCH-H: 1245	SIB
C. annulatus	05°21.62′N	076°38.75′W	Colombia	Chocó	Unión Panamericana, Salero	UTCH: COLZOOCH-H: 1428	SIB
C. annulatus	05°21.62′N	076°38.75′W	Colombia	Chocó	Unión Panamericana, Salero	UTCH: COLZOOCH-H: 1430	SIB
C. annulatus	05°21.62′N	076°38.75′W	Colombia	Chocó	Unión Panamericana, Salero	UTCH: COLZOOCH-H: 1436	SIB
C. annulatus	05°19.18′N	076°37.07′W	Colombia	Chocó	Unión Panamericana, Salero	UTCH: COLZOOCH-H: 2226	SIB
C. annulatus	05°19.18′N	076°37.07′W	Colombia	Chocó	Unión Panamericana, Salero	UTCH: COLZOOCH-H: 2329	SIB
C. annulatus	08°1.51′N	077°13.73′W	Colombia	Chocó	Cerro Tacarcuna, Unguía	ICN-R Reptile collection, voucher number not yet assigned	Medina-Rangel et al. (2017)
C annulatus	07°01.20′N	073°16.97′W	Colombia	Santander	Girón, Payoa, Río Magdalena drainage	Uncatalogued, from W. W. Lamar	Henderson et al. (2001)
C. annulatus	02°2.46′N	078°39.22′W	Colombia	Nariño	Francisco Pizarro, Salahonda	ICN-R 12701	this study
C. annulatus	03°50.53′N	077°12.04′W	Colombia	Valle del Cauca	Buenaventura	UVC-15359	SIB
C. annulatus	03°59.00′N	076°57.00′W	Colombia	Valle del Cauca	Buenaventura, Agroforestal Station Universidad del Tolima	UVC-11670	SIB
C. annulatus	10°26.00′N	083°59.00′W	Costa Rica	Heredia	Farm La Selva	LACM 150305	VertNet
C. annulatus	10°26.00′N	084°00.00′W	Costa Rica	Heredia	La Selva Biological Station	MVZ 215608	Henderson et al. (2001)
C. annulatus	10°19.48′N	083°54.34′W	Costa Rica	Heredia	Río Frio, Standard Fruit Company	UF 31612	Henderson et al. (2001)
C. annulatus	10°29.53′N	083°36.50′W	Costa Rica	Limón	Cariari	LSUMZ 34282	VertNet
C. annulatus	09°49.80′N	082°55.80′W	Costa Rica	Limón	Near San Clemente	CM 115788	VertNet
C. annulatus	09°49.80′N	082°55.80′W	Costa Rica	Limón		ANSP 26078	VertNet
C. annulatus	10°15.60′N	084°04.80′W	Costa Rica			CM 9393	VertNet
C. annulatus	15°51.54′N	088°53.48′W	Guate-mala	Izabal	Municipality of Livingstón, creek El Branchi	UTA-R 38863-64	Henderson et al. (2001)
C. annulatus	15°31.06′N	088°04.10′W	Honduras	Cortés	Sierra de Omoa, Aldea San Cristóbal, near Cofradía	UTA-R 25356-70	Henderson et al. (2001)
C. annulatus	14°55.65′N	084°32.03′W	Honduras	Gracias a Dios	Bodega de Río	USNM 561114	VertNet

Table A1. *Continued.*

Species	Latitude	Longitude	Country	Province / department	Locality	Specimen collection	Source
C. annulatus	14°21.92'N	084°56.10'W	Nicaragua	Jinotega	Biosphere Reserve Bosawas, Pamka Buhna,	UF 155940	VertNet
C annulatus	10°50.43'N	083°46.01'W	Nicaragua	Río San Juan	Refugio de Vida Silvestre Río San Juan	MHUL 142	Sunyer et al. (2014)
C. annulatus	09°24.01'N	082°30.81'W	Panama	Bocas del Toro		AMNH R-119070	Henderson et al. (2001)
C. annulatus	09°13.33'N	080°01.14'W	Panama	Colon	Achiote	KU 75662	VertNet
C annulatus	8°00.92'N	077°44.98'W	Panama	Darién	Río Tuira at río Mono	KU 110250	Henderson et al. (2001)
C. annulatus	09°09.13'N	079°50.79'W	Panama	Panama	Canal Zone, Barro Colorado Island	KU 80587	Henderson et al. (2001)
C. annulatus	09°34.13'N	078°49.41'W	Panama	San Blas	Armila, creek Venado	USNM 150128	Henderson et al. (2001)
C. annulatus	09°34.13'N	78°49.41'W	Panama	San Blas	Camp Summit	KU 110253-54	Henderson et al. (2001)
C. blombergi	02°47.09'S	079°23.54'W	Ecuador	Azuay	Molleturo, Comunidad y Reserva Ecológica Flor y Selva	UDA-AMARU 0019	Valencia et al. (2008)
C. blombergi	01°42.03'N	078°50.74'W	Colombia	Nariño	Tumaco	ICN-R 6680	Henderson et al. (2001)
C. blombergi	01°37.00'N	078°43.00'W	Colombia	Nariño	Tumaco, Vereda Cajapí km 30	ICN-R 12654	this study
C. blombergi	01°06.00'N	078°59.23'W	Ecuador	Esmeraldas	Norte de Borbón	QCAZ-R 6401	Valencia et al. (2008)
C. blombergi	01°02.34'N	078°37.37'W	Ecuador	Esmeraldas		QCAZ-R 4535	Valencia et al. (2008)
C. blombergi	00°45.20'N	078°44.53'W	Ecuador	Esmeraldas	Río bravo, salto del Bravo, Ecological Reserve Cotayachi Cayapas	FHGO 1074	Henderson et al. (2001)
C. blombergi	00°49.76'N	078°43.43'W	Ecuador	Esmeraldas	Ecological Reserve Low Zone Cotacachi Cayapas, Pichiyacu	FHGO 1572	Valencia et al. (2008)
C. blombergi	02°10.00'S	079°54.00'W	Ecuador	Guayas	Guayaquil	LACM 101297	Henderson et al. (2001)
C. blombergi	02°10.00'S	079°54.00'W	Ecuador	Guayas	Guayaquil	LACM 101298	Henderson et al. (2001)
C. blombergi	02°10.00'S	079°54.00'W	Ecuador	Guayas	Guayaquil	LACM 101299	Henderson et al. (2001)
C. blombergi	02°10.00'S	079°54.00'W	Ecuador	Guayas	Guayaquil	LACM 101300	Henderson et al. (2001)
C. blombergi	02°10.00'S	079°54.00'W	Ecuador	Guayas	Guayaquil	KU 300651	Henderson et al. (2001)
C. blombergi	02°16.19'S	079°55.62'W	Ecuador	Guayas	Río Guayaquil	AMNH-R 61754	Henderson et al. (2001)
C. blombergi	01°02.00'S	079°27.00'W	Ecuador	Los Rios	Quevedo	USNM 204087	Henderson et al. (2001)